Lenovo Global Technology
ThinkSystem SD530 V3
(2.10 GHz, Intel Xeon Platinum 8558)

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Mar-2024
Hardware Availability: Mar-2024
Software Availability: Mar-2024

Lenovo Global Technology
ThinkSystem SD530 V3
(2.10 GHz, Intel Xeon Platinum 8558)

SPECrate®2017_int_base = 425
SPECrate®2017_int_peak = Not Run

500.perlbench_r 502.gcc_r 505.mcf_r 520.omnetpp_r 523.xalancmk_r 525.x264_r 531.deepsjeng_r 541.leela_r 548.exchange2_r 557.xz_r

Hardware
CPU Name: Intel Xeon Platinum 8558
Max MHz: 4000
Nominal: 2100
Enabled: 48 cores, 1 chip, 2 threads/core
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 260 MB I+D on chip per chip
Other: None
Memory: 512 GB (8 x 64 GB 2Rx4 PC5-5600B-R, running at 5200)
Storage: 1 x 960 GB M.2 NVME SSD
Other: CPU Cooling: Air

Software
OS: SUSE Linux Enterprise Server 15 SP5
Kernel 5.14.21-150500.53-default
Compiler: C/C++ Version 2024.0.2 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2024.0.2 of Intel Fortran Compiler for Linux;
Parallel: No
Firmware: Lenovo BIOS Version FNE113F 2.20 released Jan-2024
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
Power Management: BIOS set to prefer performance at the cost of additional power usage
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**CPU2017 Integer Rate Result**

**SPECr**ate®2017_int_base = 425
**SPECr**ate®2017_int_peak = Not Run

Test Date: Mar-2024
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Software Availability: Mar-2024

---

### Results Table

<table>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
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<td>305</td>
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</tr>
</tbody>
</table>

**SPECr**ate®2017_int_base = 425
**SPECr**ate®2017_int_peak = Not Run

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

---

### Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor.
For details, please see the config file.

---

### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

---

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = 
"/home/cpu2017-1.1.9-ic2024.0.2/lib/intel64:/home/cpu2017-1.1.9-ic2024.0.2/lib/ia32:/home/cpu2017-1.1.9-ic2024.0.2/lib/:/home/cpu2017-1.1.9-ic2024.0.2/lib/je5.0.1-32"
MALLOC_CONF = "retain:true"

---

### General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

(Continued on next page)
General Notes (Continued)

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
SNC set to SNC2
LLC Prefetch set to Disabled

Sysinfo program /home/cpu2017-1.1.9-ic2024.0.2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Wed Mar 20 19:14:45 2024

SUT (System Under Test) info as seen by some common utilities.

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1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numacl --hardware
9. /proc/meminfo
10. who -r
11. systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. systc1
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS
-------------------------------------

1. uname -a
Linux localhost 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)
x86_64 x86_64 x86_64 GNU/Linux

2. w
19:14:45 up 1 min, 1 user, load average: 0.06, 0.03, 0.01
USER  TTY   FL   LOGNAME   PID %CPU %MEM    SWAP   NICE VIRT  RES   SHR   EXIT
root tty1  -r   19:14  13.00s 1.03s  0.01s /bin/bash ./rate_int.sh

3. Username
From environment variable $USER: root

(Continued on next page)
Platform Notes (Continued)

4. ulimit -a
   core file size  (blocks, -c) unlimited
   data seg size   (kbytes, -d) unlimited
   scheduling priority  (-e) 0
   file size       (blocks, -f) unlimited
   pending signals (i) 2062601
   max locked memory (kbytes, -l) 64
   max memory size  (kbytes, -m) unlimited
   open files       (-n) 1024
   pipe size       (512 bytes, -p) 8
   POSIX message queues  (bytes, -q) 819200
   real-time priority (-r) 0
   stack size      (kbytes, -s) unlimited
   cpu time         (seconds, -t) unlimited
   max user processes (-u) 2062601
   virtual memory   (kbytes, -v) unlimited
   file locks       (-x) unlimited

5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   login -- root
   -bash
   /bin/bash ./rate_int.sh
   /bin/bash ./rate_int.sh
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=96 -c
   ic2024.0.2-lin-sapphirerapids-rate-20231213.cfg --define smt-on --define cores=48 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base -o all intrate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=96 --configfile
   ic2024.0.2-lin-sapphirerapids-rate-20231213.cfg --define smt-on --define cores=48 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
   rate --tune base --size refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.087/templogs/preenv.intrate.087.0.log --lognum 087.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017-1.1.9-ic2024.0.2

6. /proc/cpuinfo
   model name      : INTEL(R) XEON(R) PLATINUM 8558
   vendor_id       : GenuineIntel
   cpu family      : 6
   model           : 207
   stepping        : 2
   microcode       : 0x21000200
   bugs            : spectre_v1 spectre_v2 spec_store_bypass swappgs eibrspbrsb
   cpu cores       : 48
   siblings        : 96
   1 physical ids (chips)
   96 processors (hardware threads)
   physical id 0: core ids 0-47
   physical id 0: apicids 0-95
   Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
   virtualized systems. Use the above data carefully.

7. lscpu

From lscpu from util-linux 2.37.4:
   Architecture:          x86_64
   CPU op-mode(s):         32-bit, 64-bit
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Platform Notes (Continued)

Address sizes: 46 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Vendor ID: GenuineIntel
Model name: INTEL(R) XEON(R) PLATINUM 8558
CPU family: 6
Model: 207
Thread(s) per core: 2
Core(s) per socket: 48
Socket(s): 1
Stepping: 2
BogoMIPS: 4200.00
Flags:

Virtualization: VT-x
L1d cache: 2.3 MiB (48 instances)
L1i cache: 1.5 MiB (48 instances)
L2 cache: 96 MiB (48 instances)
L3 cache: 260 MiB (1 instance)
NUMA node(s): 2
NUMA node0 CPU(s): 0-23, 48-71
NUMA node1 CPU(s): 24-47, 72-95
Vulnerability Itlb multihit: Not affected
Vulnerability Lttf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mnio stale data: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapsps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBRS conditional, RSB filling, POMSB-eIBRS SW sequence
Vulnerability Srbds: Not affected
Vulnerability Tax async abort: Not affected

From lscpu --cache:

<table>
<thead>
<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d</td>
<td>42K</td>
<td>2.3M</td>
<td>12</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>1.5M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
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<td>64</td>
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<td>2M</td>
<td>90M</td>
<td>16</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>260M</td>
<td>260M</td>
<td>20</td>
<td>Unified</td>
<td>3</td>
<td>212392</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

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(Continued on next page)
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SPECrater®2017_int_base = 425
SPECrater®2017_int_peak = Not Run

Platform Notes (Continued)

NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0-23,48-71
node 0 free: 256879 MB
node 1 cpus: 24-47,72-95
node 1 size: 258015 MB
node 1 free: 257210 MB
node distances:
node   0   1
0:  10  12
1:  12  10

9. /proc/meminfo
MemTotal: 528056680 kB

10. who -r
run-level 3 Mar 20 19:13

11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ irqbalance issue-generator kbdsettings klog lvm2-monitor nscd nvme-sc-boot-connections postfix purge-kernels rollback rsyslog smartd sshd systemd-pstore wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime systemd-remount-fs
indirect wicked

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
root=UUID=f243a704-c613-4a2e-b642-e5754787f2a2
splash=silent
mitigations=auto
quiet
security=apparmor

14. cpupower frequency-info
analyzing CPU 0:
   Unable to determine current policy
   boost state support:
   Supported: yes
   Active: yes

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

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Platform Notes (Continued)

15. sysctl
   kernel.numa_balancing               1
   kernel.randomize_va_space           2
   vm.compaction_proactiveness         20
   vm.dirty_background_bytes           0
   vm.dirty_background_ratio          10
   vm.dirty_bytes                      0
   vm.dirty_expire_centisecs           3000
   vm.dirty_ratio                      20
   vm.dirty_writeback_centisecs       500
   vm.dirtytime_expire_seconds        43200
   vm.extr frag_threshold              500
   vm.min_unmapped_ratio               1
   vm.nr_hugepages                     0
   vm.nr_hugepages_mempolicy           0
   vm.nr_overcommit_hugepages          0
   vm.swappiness                      60
   vm.watermark_boost_factor           15000
   vm.watermark_scale_factor           10
   vm.zone_reclaim_mode                0

16. /sys/kernel/mm/transparent_hugepage
   defrag          always defer defer+advise [advise] never
   enabled         [always] madvise never
   hpage_pmd_size  2097152
   shmem_enabled   always within_size advise [never] deny force

17. /sys/kernel/mm/transparent_hugepage/khugepaged
   alloc_sleep_millisecs  60000
   defrag  1
   max_ptes_none  511
   max_ptes_shared  256
   max_ptes_swap  64
   pages_to_scan  4096
   scan_sleep_millisecs  10000

18. OS release
   From /etc/*-release /etc/*-version
   os-release SUSE Linux Enterprise Server 15 SP5

19. Disk information
   SPEC is set to: /home/cpu2017-1.1.9-ic2024.0.2
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/nvme0n1p3 xfs   893G   49G  845G   6% /

20. /sys/devices/virtual/dmi/id
   Vendor: Lenovo
   Product: ThinkSystem SD530 V3
   Product Family: ThinkSystem
   Serial: PASDVMK006

21. dmidecode
   Additional information from dmidecode 3.4 follows. WARNING: Use caution when you interpret this section.
# Lenovo Global Technology

## SPEC CPU®2017 Integer Rate Result

### Lenovo Global Technology

**ThinkSystem SD530 V3**

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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

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<th>Mar-2024</th>
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<td>Hardware Availability:</td>
<td>Mar-2024</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Mar-2024</td>
</tr>
</tbody>
</table>

## Platform Notes (Continued)

The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

**Memory:**

- 3x Samsung M321R8GA0PB0-CWMKH 64 GB 2 rank 5600, configured at 5200
- 5x Samsung M321R8GA0PB0-CWMXH 64 GB 2 rank 5600, configured at 5200

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### BIOS

(This section combines info from /sys/devices and dmidecode.)

- **BIOS Vendor:** Lenovo
- **BIOS Version:** FNE113F-2.20
- **BIOS Date:** 01/02/2024
- **BIOS Revision:** 2.20
- **Firmware Revision:** 1.10

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### Compiler Version Notes

<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)</th>
</tr>
</thead>
</table>

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213  
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<table>
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Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

<table>
<thead>
<tr>
<th>Fortran</th>
<th>548.exchange2_r(base)</th>
</tr>
</thead>
</table>

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213  
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### Base Compiler Invocation

**C benchmarks:**

- icx

**C++ benchmarks:**

- icpx

**Fortran benchmarks:**

- ifx
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**Base Portability Flags**

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

**Base Optimization Flags**

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/opt/intel/oneapi/compiler/2024.0/lib -lqkmalloc

C++ benchmarks:
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/opt/intel/oneapi/compiler/2024.0/lib -lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/opt/intel/oneapi/compiler/2024.0/lib -lqkmalloc

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-AA.html
http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-AA.xml
http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.9 on 2024-03-20 07:14:44-0400.
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